

WHAT IS CLAIMED IS:

1. A photodiode array comprising a semiconductor substrate of a first conduction type formed with an array of a plurality of pn junction type photodiodes on an incident surface side for light to be detected, the surface opposite from the incident surface in the semiconductor substrate being made of a (100) plane; the semiconductor substrate having a through hole, formed in an area held between the photodiodes, penetrating through the semiconductor substrate from the incident surface side to the opposite surface side;

the photodiode array comprising a conductive layer extending from the incident surface to the opposite surface by way of a wall surface of the through hole;

the through hole comprising:

a vertical hole part formed substantially perpendicular to the incident surface on the incident surface side, and

a pyramidal hole part formed like a quadrangular pyramid on the opposite surface side;

the vertical hole part and pyramidal hole part being connected to each other within the semiconductor substrate,

the pyramidal hole part having a wall surface formed as a (111) plane.

2. A photodiode array according to claim 1, further comprising a high impurity concentration layer of the first

conduction type surrounding the through hole within the semiconductor substrate.

3. A method of making a photodiode array, the method comprising:

5 a first step of preparing a semiconductor substrate having a first surface formed as a (100) plane, and forming a predetermined area of a second surface opposite from the first surface with an array of a plurality of pn junction type photodiodes;

10 a second step of forming a pyramidal depression having a quadrangular pyramid form with a depth smaller than a thickness of the semiconductor substrate from the first surface side of the semiconductor substrate by anisotropic etching for the plurality of photodiodes;

15 a third step of forming a vertical hole substantially perpendicular to the second surface by dry etching from the second surface side at a position corresponding to the pyramidal depression, and connecting the pyramidal depression to the vertical hole, so as to form a through
20 hole penetrating through the semiconductor substrate from the second surface to the first surface; and

a fourth step of forming a conductive layer extending from the second surface to the first surface by way of the through hole.

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